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# स्वचल वाहन — शीतलीकरण कार्यकारिता — मापन पद्धति

*Indian Standard*

# AUTOMOTIVE VEHICLES — COOLING PERFORMANCE — METHOD OF MEASUREMENT

ICS 040.01; 43.060.30

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**BUREAU OF INDIAN STANDARDS**
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

*June* 1998

**Price Group 2**

Automotive Vehicle Testing and Performance Evaluation Sectional Committee, TED 8

## FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Automotive Vehicle Testing and Performance Evaluation Sectional Committee had been approved by the Transport Engineering Division Council.

This standard is one in the series of Indian Standard being developed for Automotive testing of performance evaluation.

The committee responsible for preparation of this standard is given in Annex A.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values ( *revised* )'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

# AMENDMENT NO. 1 FEBRUARY 2006
# TO
# IS 14557 : 1998 AUTOMOTIVE VEHICLES — COOLING PERFORMANCE — METHOD OF MEASUREMENT

( *Page* 1, *clause* **1**, *last sentence* ) — Substitute 'coolant cooled engine' *for* 'water cooled engines'.

( *Page* 1, *clause* **2.1** ) — Substitute 'run-in' *for* 'run in'.

( *Page* 1, *clause* **2.4** ) — Substitute 'running-in' *for* 'running in'.

( *Page* 1, *clause* **2.11** ) — Substitute 'as per manufacturer's specification' *for* 'as per release'.

( *Page* 1, *clause* **2.12** ) — Substitute '90 percent of its capacity specified' *for* '90 percent minimum of its capacity'.

( *Page* 1, *clause* **3** ) — Add the following at the end:

d) Wind air velocity : Less than 3 m/sec'

( *Page* 1, *clause* **4.1** ) — Add the following at the end:

'Accessories affecting cooling system (like air conditioning, intercooler, EGR cooling) should be operated.'

[ *Page* 2, *clause* **4.4**(b) ] — Substitute 'at radiator inlet' *for* 'at inlet'.

( *Page* 2, *clause* **4.5** ) — Substitute the following for existing clause:

'Record the temperatures at radiator inlet, radiator outlet, ambient and oil temperature in the stabilized condition.'

( *Page* 2, *clause* **4.7** ) — Substitute 'coolant temperature at radiator inlet' *for* 'coolant temperature' and add the following at the end:

'Measure the difference between maximum stabilized coolant temperature at inlet and outlet of radiator.'

( TED 4 )

Reprography Unit, BIS, New Delhi, India

# *Indian Standard*

# AUTOMOTIVE VEHICLES — COOLING PERFORMANCE — METHOD OF MEASUREMENT

## 1 SCOPE

This Standard outlines the general practice for measurement of cooling performance of automotive vehicles other than two and three wheelers. This is applicable to all road vehicles fitted with water cooled engines.

## 2 VEHICLE PREPARATION

**2.1** The vehicle shall be run in as per the practice recommended by the vehicle manufacturer.

**2.2** The vehicle shall conform in all its parts, components and systems to the technical specification declared by the manufacturer, especially cooling systems. If any other coolant or additives are used solely or along with water as a coolant; the water to coolant or additives ratio shall be as per the recommendations of the vehicle manufacturer. Prior to testing the coolant system shall be filled to at least 90 percent of its capacity specified by the vehicle manufacturer.

**2.3** The adjustment of fuel system, ignition system, adjustment of brakes, clutch, idling speed and grades, quality, quantity of lubricants for various moving parts, etc, shall conform to the recommendations specified by the manufacturer.

**2.4** The tyres shall be run-in at the same time as the vehicle and shall have a tread depth not less than 90 percent of tread depth of a new tyre and shall have operated for at least 500 km, or the distance recommended for running in of the vehicle, whichever is lower, on road prior to test.

**2.5** The tyre pressure shall be adjusted to the value recommended by the vehicle manufacturer, when cold and shall not exceed the maximum value specified in the relevant Indian Standard for that size of tyre.

**2.6** All the fuel enrichening devices other than those required for the normal functioning of the vehicle shall not be operative during the test.

**2.7** The test vehicle shall be loaded appropriately to give adequate traction while towing the loaded vehicle/trailed dynamometer to the value recommended by the manufacturer as given in **4.4** below to load the engine to its maximum power capacity.

**2.8** Thermostat in the cooling system shall be set to remain in full open condition during the test.

**2.9** Appropriate instrumentation shall be provided in the vehicle to measure temperatures mentioned at **4.4** below within an accuracy of ± 2°C.

**2.10** The engine rpm measuring equipment shall be installed and the accuracy of it shall be within ± 1 percent.

**2.11** The engine cooling system shall be as per release and coolant ratio (water and ethylene glycol) shall be as per the recommendations of the vehicle manufacturer.

**2.12** The cooling system shall be filled 90 percent minimum of its capacity before starting of the test.

**2.13** The exhaust back pressure, air in take depression and turbo-boost pressure (in case of turbo charged engine) shall be within the limits specified by the manufacturer for maximum engine power.

## 3 AMBIENT CONDITIONS

Ambient conditions at test site shall be as given below:

a) Temperature : 303-313K

b) Atmospheric pressure : 86-106 kPa

c) Relative humidity : Not more than 75 percent.

## 4 TEST PROCEDURE

**4.1** The test shall be conducted on a test track fairly flat and smooth, the longitudinal gradient being not more than 2 percent.

**4.2** Attach a trailer dynamometer or a loaded vehicle or any other suitable loading device to the vehicle so that the engine of the vehicle can be loaded to the maximum power capacity declared by the manufacturer as determined by corresponding engine speed with tolerance specified by the manufacturer. Alternatively it can be carried out by the chassis dynamometer.

**4.3** Drive the vehicle in lowest gear (the highest numerical ratio) at full throttle and adjust the load of the towed vehicle such that the engine rpm is maintained within ± 3 percent of the rev/min at which engine develops maximum power.

**4.4** In this condition, drive the vehicle continuously. The temperature of engine coolant at the inlet to the radiator, at the outlet of the radiator and engine oil temperature shall be recorded continuously, if possible. If continuous recording is not possible, these shall be noted at a frequency of not more than one minute. Continue to drive the vehicle till any one of the following condition is met:

a) Till the temperature of the coolant stabilizes at the inlet to radiator for five minutes,

b) The temperature of coolant at inlet goes above the safe limit recommended by the manufacturer,

c) The coolant starts boiling, and

d) The engine oil temperature goes above the safe limit recommended by the manufacturer.

**4.5** Record the temperatures at the end of test before the vehicle is stopped. Record the total duration and the distance covered during the test.

**4.6** Repeat the operations specified at **4.2** to **4.5** for engine maximum torque and rpm condition.

**4.7** Measure the difference between maximum stabilized coolant temperature and the ambient temperature and record it.

**4.8** In case the trial is stopped for any one of the reasons specified in **4.4**(b), (c) or (d); in both maximum power and maximum torque conditions the vehicle is deemed to be unsatisfactory for the purpose of this standard.

## ANNEX A

### ( *Foreword* )

### COMMITTEE COMPOSITION

### Automotive Vehicles Performance Evaluation and Testing Sectional Committee, TED 8

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Shri R. Ramakrishnan
28, I Cross Road, Kasturi Bai Nagar,
Adyar, Chennai 600020

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( *Continued on page* 4 )

( *Continued from page* 3 )

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Headquarters:

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|---|---|
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